

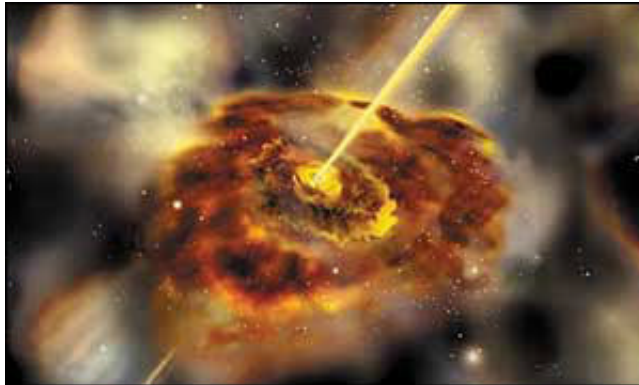


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**By Dr David Whitehouse**

BBC News Online science editor

The most detailed view yet of a feeding black hole in the centre of a remote quasar has been obtained.

A team of radio astronomers has mapped a cold ring of gas around a supermassive black hole at the core of quasar QSO I Zw 1.

They say it is the best evidence yet that gigantic molecular clouds fuel the formation of stars in the region around galactic black holes.

A small fraction of this material might find its way into the black hole as fuel to power the brilliant quasar.

**Remote object**

Quasars are extremely luminous but distant objects - they are most probably galaxies that contain gigantic black holes.

"Quasars are extremely remote, and this observation is at the limit of current capability," says Johannes Staguhn, a radio astronomer at the US space agency's (Nasa) Goddard Space Flight Center in Maryland.

The researchers chose QSO I Zw 1 because it is one of the closest quasars, being about 800

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million light-years away in the direction of the constellation Pisces.

They looked at radio waves from cold carbon monoxide molecules situated in the dense gas clouds of QSO I Zw 1 to map the structure of the clouds.

Using the radio telescope array at Hat Creek, California, the researchers were able to see details in the quasar less than a kiloparsec (about 3,000 light-years) in size - the first time detail at this scale has been seen in such a remote object.

The ring of gas clouds they saw at the heart of the quasar is about 4,000 light-years from the centre, rotating around it at about 200 kilometres per second (125 miles per second). The cloud contains the mass of more than a billion suns.

### **At the limit**

"We have hints that some of the cold gas clouds may be moving toward the galactic centre, but since the observation is at the limit of the telescope's capability, the signal to noise ratio is too poor to confirm this," says Staguhn.

The gas in the ring will fragment to form stars. However, some of it will fall directly on to the black hole and become superhot as it is pulled inwards.

Because the source of the gas for star formation and for feeding the black hole is the same gas cloud, astronomers are hoping that they can find a relationship between star formation at the hearts of quasars and how brightly such quasars shine.

"More detailed observations that will help determine if a link exists between bursts of star formation and quasars will have to wait for improved radio telescopes, like the proposed Atacama Large Millimetre Array," Staguhn adds.

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